

Application No. 10/648,983
Filed: August 27, 2003
TC Art Unit: 3746
Confirmation No.: 4351

REMARKS

In the most recent office action, claims 1-26 were examined. Claims 1-4, 10-17 and 22-26 are rejected. Claims 5-9 and 18-21 are objected to. In response, claims 1 - 26 remain pending. No new matter is added.

Applicant thanks the Examiner for the thorough search and consideration of the invention recited in the claims of the present application, and responds to the comments in the Office Action as follows.

Claim Rejections - 35 U.S.C. § 103

The Office Action states that claims 1-4, 10-17 and 22-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cherry et al. (US Patent No. 3,795,106) in view of Calabro et al (US Patent No. 6,148,610). In particular, the Office Action states that each and every element recited in the rejected claims is either taught in the reference by Cherry et al., Calabro et al., an obvious combination thereof, or obviously known to one of ordinary skill in the art. Applicant respectfully traverses the rejection.

The disclosure by Cherry et al appears to discuss baffles that are disposed transverse to the axis of the solid propellant grain. However, Cherry et al. also state that:

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The baffle may be of a disc configuration with simply a hole in the center, or of such other design as necessary to adapt to a given grain perforation shape. For example, the grain may be star-shaped in the center, thus, the aperture in the center of the baffle could be star shaped to suit the star-grain of the segmented cartridge-loaded grain design.

Accordingly, the disclosure by Cherry et al. teaches that a baffle should be constructed to have the same shape as the combustion gas flow channel in the solid propellant rocket engine. Claim 1 of the present invention, for example, recites

at least one insert disposed in the thruster body transversely relative to a combustion gas flow channel formed in the solid propellant charge, the insert including a single opening of non-axisymmetric shape that is different from the shape of the gas flow channel,

which is ostensibly opposite to the teaching of Cherry et al. Accordingly, not only does the disclosure by Cherry et al. fail to teach or suggest a number of elements recited in Claim 1, it actually teaches against the inventive subject matter.

The disclosure by Calabro et al. fails to cure the deficiencies noted in the disclosure of Cherry et al. with respect to the elements recited in claim 1 of the present invention, for example. Calabro et al. appear to teach a propellant charge with different shapes, but fail to teach or suggest the use of a baffle or insert in a solid propellant thruster. In addition, neither of the disclosures by Cherry et al. or Calabro et al. teach or suggest the creation of a three-dimensional effect in the

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combustion gas flow channel to prevent axissymmetric turbulent modes from forming in the thruster. This particular element is specifically described in the specification and the drawings of the present application. Accordingly, none of the cited prior art references of Cherry et al. or Calabro et al. teach or suggest all of the elements recited in Claim 1 of the present invention, for example, either by themselves or in combination. Because the cited prior art references do not teach or suggest all of the claim limitations, they do not by themselves establish a *primie facie* of obviousness.

The Office Action states that it would have been obvious to one of ordinary skill in the art to create the insert recited in claim 1 of the present invention, but does not provide any evidence in support of such a conclusion. With regard to rejections under 35 U.S.C. §103, "the examiner must provide evidence which as a whole shows that the legal determination sought to be proved, (i.e., the reference teachings establish a *primie facie* case of obviousness) is more probably than not." MPEP, §2142. In this instance, the Examiner has not met the legal standard with respect to producing evidence in support of the assertion of obviousness. Instead, the Examiner simply states,

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it would have been obvious to one of ordinary skill in the art to make the insert of different shape than the gas flow channel to control the pressure and thrust oscillations,

which is merely the legal conclusion sought to be proved. In the absence of evidence in support of a rejection under 35 U.S.C. §103, a *prima facie* case of obviousness is not established. Accordingly, Applicant respectfully submits that the rejection of Claim 1 under 35 U.S.C. §103(a) is overcome, and respectfully requests that it be reconsidered and withdrawn.

Claims 2-4 and 10-14 depend upon and further limit claim 1 and should be allowable for the same reasons as claim 1. Applicant therefore respectfully requests that the rejection of claims 2-4 and 10-14 under 35 U.S.C. §103(a) be reconsidered and withdrawn.

Claims 15-17 and 22-26 recite a number of elements that are not found in the cited prior art references and should not be found obvious for the same reasons as given with respect to Claim 1. Accordingly, Applicants respectfully request that the rejection of claims 15-17 and 22-26 under 35 U.S.C. §103(a) be reconsidered and withdrawn.

Applicant also notes that the Office Action states that the function of generating a three dimensional effect on the flow in the combustion gas flow channel is an inherent result of the non-

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axissymmetric aperture. However, there is no statement or teaching in any of the cited prior art references, either alone or in combination, to indicate that a three-dimensional effect is created with a non-axissymmetric opening in an insert provided to a solid propellant thruster. Accordingly, Applicant respectfully submits that this element is not taught, inherent, or suggested in any of the cited prior art references.

The Office Action also states that making propellant blocks and inserts integral or part of a single block is an obvious matter of integration, indicating that such would be obvious to one of ordinary skill in the art. However, as indicated in the cited prior art references, integrating propellant blocks is not an obvious matter and includes a number of challenges that requires sophisticated consideration to produce the desired effects. Integrating an insert with plural blocks is similarly prone to the same sort of non-obvious challenges, and would therefore not be obvious to one of ordinary skill in the art.

The Office Action states that claims 1, 4, 10-15, 17 and 22-26 are rejected under 35 U.S.C. §103(a) as being unpatentable over Stark (US Patent No. 3,423,943) in view of Calabro et al. In particular, the Office Action states that it would have been obvious to modify the reference teachings to produce the invention

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recited in the rejected claims. The rejection is respectfully traversed.

As noted in the Office Action, the disclosure by Stark fails to teach an opening in an insert with a shape that is different than that of the flow channel. This missing element, among others, is discussed above with respect to the rejection based on the combination of Cherry et al. and Calabro et al. Accordingly, Applicant notes that the disclosures by Stark and Calabro et al. fail to teach or suggest a number of elements recited in the rejected claims and therefore do not support a *prima facie* case of obviousness, either alone or in combination.

Applicant also notes that disclosure by Stark is for a hybrid rocket motor where the oxidizer in liquid form is added to the combustion chamber, as opposed to the solid propellant of the present invention where the fuel and oxidizer are both included in the solid propellant. The type of rocket motor disclosed by Stark is substantially different in character and operation than that of the solid propellant thruster recited in the claims of the present invention. Accordingly, one of ordinary skill in the art would not be motivated to adapt the disclosure by Stark for use in the present invention to prevent axisymmetric turbulent modes from forming in the thruster, as is recited in Claim 1. In addition,

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the disclosure by Stark focuses on optimizing the mixture between the solid fuel and the liquid oxidizer. Stark provides no suggestion to arrive at the invention recited in claim 1, or to combine its disclosure with that of Calabro et al. to arrive at the present invention recited in Claim 1.

Moreover, Applicant notes that there has been insufficient evidence provided to support the statement in the Office Action,

[i]t would have been obvious to one of ordinary skill in the art to make the insert of different shape than the gas flow channel to control the pressure and thrust oscillations.

As noted above, the Examiner must provide evidence in support of a *prima facie* case of obviousness and cannot rely on the assertion of the legal conclusion sought to be proved.

Applicant also contests the conclusion of obviousness with respect to the preparation of propellant blocks and inserts as integral or in a single block as discussed above with respect to the rejection over the disclosures by Cherry et al. and Calabro et al.

For all of the above reasons, applicant respectfully believes that the rejection of claim 1 under 35 U.S.C. §103(a) over Stark in view of Calabro et al. is overcome, and respectfully requests that it be reconsidered and withdrawn.

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Claims 4 and 10-14 depend upon and further limit claim 1, and should be allowable for the same reasons as claim 1, and for the further limitations recited in those claims. Applicant therefore respectfully requests that the rejection of claims 4 and 10-14 under 35 U.S.C. § 103(a) over Stark in view of Calabro et al., be reconsidered and withdrawn.

Claims 15 is also believed to be allowable under 35 U.S.C. §103(a) over Stark in view of Calabro et al., and applicant respectfully requests that the rejection be reconsidered and withdrawn.

Claims 17 and 22-26 depend upon and further limit claim 15 and should be allowable for the same reasons as claim 15 and for the further limitations recited in those claims. Applicant therefore respectfully requests that the rejection of claims 17 and 22-26 under 35 U.S.C. §103(a) over Stark in view of Calabro et al be reconsidered and withdrawn.

Allowable Subject Matter

Claims 5-9 and 18-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form to include all the limitations of the base claim and any intervening claims. Applicant respectfully submits that

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in view of the above discussion, claims 5-9 and 18-21 now depend upon claims that are believed to be allowable to thereby overcome the objection. Applicant accordingly respectfully requests that the objection to claims 5-9 and 18-21 be reconsidered and withdrawn, and that the claims be found allowable over the cited prior art references.

Conclusion

In view of the above discussion, Applicant respectfully submits that the present application is now in condition for allowance, and earnestly solicits notice of allowance for claims 1-26. The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite allowance of the present application.

Respectfully submitted,

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